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**Emergency alert apparatus for a land vehicle, emergency alert system**  
**Incorporating such an emergency alert apparatus and a method of alerting**  
**search and rescue personnel to an emergency condition of a land vehicle**

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**ORIGINAL**

**COMPLETE SPECIFICATION**

**STANDARD PATENT**

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Invention Title: "Emergency Alert Apparatus for a Land Vehicle, Emergency Alert System Incorporating such an Emergency Alert Apparatus and a Method of Alerting Search and Rescue Personnel to an Emergency Condition of a Land Vehicle"

Details of Associated Provisional Application No(s): PP6346

The following statement is a full description of this invention, including the best method of performing it known to me:-

TITLE

Emergency Alert Apparatus for a Land Vehicle, Emergency Alert System Incorporating such an Emergency Alert Apparatus and a Method of Alerting Search and Rescue Personnel to an Emergency Condition of a Land Vehicle.

FIELD OF THE INVENTION

Occupants of land vehicles travelling in isolated areas are exposed to serious risk should the land vehicle encounter an emergency situation. This is due, not only to the emergency situation itself, but also to the problem of emergency assistance services not being aware of the plight of the occupants of the vehicle. Clearly, if they are unaware of the situation they cannot attend to provide assistance.

For example, should the land vehicle suffer an impact, collision or roll-over, the occupants may be seriously injured. Those injuries may actually prevent them from raising an alert of the emergency condition. Unless another vehicle encounters the vehicle which has experienced the emergency condition, there is no facility for an alert being raised. Generally, it is only when the vehicle is reported missing or overdue to authorities that a search and rescue operation is mounted. However, the delay in this means that the occupants must wait for significant periods of time prior to assistance arriving. This delay may prove fatal for someone with serious injuries.

In addition, emergency conditions in land vehicles travelling in isolated areas may occur even when the occupants are not injured. For example, the vehicle may experience mechanical breakdown leaving the occupants stranded. Again, in such a case there is no facility for an alert to be raised so that search and rescue personnel are alerted to the emergency condition facing the occupants.

The present invention is directed to enabling an alert to be raised when a vehicle encounters an emergency condition so that search and rescue assistance can be mounted as required.

### DISCLOSURE OF THE INVENTION

In accordance with a first aspect of the present invention there is provided an emergency alert apparatus for a land vehicle comprising sensor means arranged to be installed in the land vehicle and transmitter means operatively associated with said sensor means, wherein, in use, when said sensor means senses an emergency condition said transmitter means is activated and emits an emergency alert signal.

Preferably, said emergency alert apparatus enables said emergency alert signal to be transmitted regardless of the orientation of said vehicle as a result of said emergency condition.

Preferably, said emergency alert apparatus is provided with aerial means for transmission of said emergency alert signal.

The said aerial means may comprise individual aerals provided on said vehicle such that at least one said aerals is able to transmit said emergency alert signal.

As an alternative, or in addition to the aerial means comprising individual aerals, the aerial means may comprise at least one part of said vehicle.

Preferably, said emergency alert apparatus is provided with manual override means such that said transmitter means may be manually activated.

The sensor means may comprise a sensor which is able to sense a plurality of emergency conditions. One or more such sensors may be provided.

Alternatively, or in addition, the sensor means may comprise a separate sensor to sense one or more emergency conditions. More than one such sensor may be provided.

Preferably, the sensor means is able to sense emergency conditions such as vehicle impact or collision and vehicle roll-over. The impact or collision may be

front, rear or side impact of the vehicle. The roll-over may be rolling over of the vehicle onto its roof or one of its sides.

Preferably, said transmitter means is operatively associated with said sensor means by control means such that, in use, upon said sensor means sensing an emergency condition said control means receives a signal from said sensor means.

In accordance with a second aspect of the present invention, there is provided an emergency alert system comprising an emergency alert apparatus as herein before described and signal monitoring means to monitor signals that are indicative of the emission of an emergency alert signal by the transmitter means of said emergency alert apparatus.

The emergency alert system may provide that the signal monitoring means is able to directly receive the emergency alert signal emitted by said transmitter means.

Preferably, said emergency alert system further comprises receiver/transmitter means that is arranged to receive said emergency alert signal and then transmit another signal that is received by said signal monitoring means.

The receiver/transmitter means may comprise two or more separate receiver/transmitter units that are able to relay a signal to the signal monitoring means.

In accordance with a third aspect of the present invention there is provided a method of alerting search and rescue personnel to an emergency condition of a land vehicle comprising sensing an emergency condition encountered by a land vehicle, issuing an emergency alert signal and receiving a signal at a signal monitoring means which signal is indicative of said emergency condition.

The method may provide that the emergency alert signal is received directly by said signal monitoring means.

Preferably, the method further comprises receiving said emergency alert signal by a receiver/transmitter means which then issues another signal which is received at said signal monitoring means.

The signal that is received at the signal monitoring means may be the emergency alert signal emitted by the transmitter means or a signal emitted by the receiver/transmitter means.

### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a schematic drawing of an embodiment of an emergency alert system in accordance with an aspect of the present invention.

### DETAILED DESCRIPTION

In Figure 1, there is shown an emergency alert system 10 which comprises an emergency alert apparatus 1 for a vehicle 2, and a signal monitoring station 12.

The emergency alert apparatus 1 comprises a sensor 3 and a transmitter 4.

The sensor 3 is arranged to be installed in the vehicle 2.

The transmitter 4 is operatively associated with the sensor 3. When the sensor 3 senses an emergency condition, the transmitter 4 is activated and emits an emergency alert signal 5 which is transmitted by an aerial 6.

The emergency conditions that may be sensed by the sensor 3 include a front, rear or side impact or collision of the vehicle 2 (which is shown, by way of example, in Figure 1) and rolling over of the vehicle 2.

Accordingly, the sensor 3 is of a type able to sense a front, rear and side impact or collision of the vehicle 2 and rolling over of the vehicle 2 onto one of its sides or

roof. The sensor 3 is able to sense such emergency conditions which then results in the transmitter 4 being activated.

Alternatively, separate sensors may be provided to sense front, rear and side impacts and rolling over of the vehicle 2, or combinations of such impacts. Multiple such sensors may be provided.

The sensor 3 does not sense any non-emergency condition during the normal operation of the vehicle 2 so that the transmitter 4 is activated only in an emergency condition.

The sensitivity of the emergency alert apparatus 1 may be set such that only impacts and collisions above a threshold level result in the transmitter 4 being activated. This may be done, for example, by the transmitter 4 being activated only when the sensor 3 senses an impact or collision above a threshold level.

The operative association of the transmitter 4 with the sensor 3 may be via a control unit 9. The control unit 9 also acts as a data store of the last position of the vehicle 2 upon the sensor 3 sensing an emergency condition. The control unit 9 comprises at least one microprocessor unit.

The control unit 9 is preferably capable of cold-booting and re-initialising the system without intervention should this be necessary.

The sensor 3 and transmitter 4 may be powered by a long life battery pack (not shown), which may be rechargeable.

The battery pack is provided in case the normal vehicle power supply is interrupted. The longlife battery pack has a capability of running all equipment for proper operation of the emergency alert apparatus for an extended period of time, for example 2 hours after the occurrence of an emergency condition.

The emergency alert apparatus 1 may comprise more than one sensor 3.

Whilst only a single aerial 6 is shown in Figure 1, more than one aerial 6 may be provided.



Accordingly, a number of individual aerals 6 may be provided such that in the event of an impact, collision or roll-over of the vehicle 2, which may cause one or more aerals 6 to be damaged (e.g. by being snapped off), there is at least one aerial 6 that will remain undamaged and able to transmit the emergency alert signal 5. For example, four individual aerals 6 may be provided, one being provided on the underside of the vehicle, one on the upperside and one on each side of the vehicle 2.

As an alternative, or in addition to individual aerals 6, one or more parts of the vehicle 2 may act as an aerial or aerals.

The transmitter 4 is able to send formatted data via an aerial 6.

Preferably, the transmitter 4 is able to withstand high VSWR on the aerial ports and still send the signal via a good aerial port. If the transmitter 4 is not capable of developing an effective signal into high VSWR loads, then a switcher may be incorporated to isolate the damaged aerial ports to allow an effective signal to be transmitted.

The transmitter 4 is sized such that the signal emitted thereby is able to be detected within the desired area.

In addition, the transmitter 4 is provided such that it will not cause interference to operation of the vehicle 2 or any other vehicle in close proximity during the emission of the emergency alert signal 5 by the transmitter 4.

The components of the emergency alert apparatus 1 are capable of operating in adverse weather conditions, e.g. within a temperature range of  $-20^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  and up to 90% non-condensing humidity.

The emergency alert system 10 shown in Figure 1 further comprises a receiver/transmitter 16. The receiver/transmitter 16 is able to receive the emergency alert signal 5 emitted by the transmitter 4 of the emergency alert apparatus 1. Upon receiving an emergency alert signal 5, the receiver/transmitter 16 emits a signal 18. The signal 18 is received by the signal monitoring station 12.

The signal monitoring station 12 is also able to directly receive the emergency alert signal 5 emitted by the transmitter 4. However, since the distance between the vehicle 2 and the signal monitoring station 12 will be large in many circumstances, the distance will prevent the signal 5 being received directly by the signal monitoring station 12.

The receiver/transmitter 16 may, for example, be a satellite or aircraft.

An board GPS unit (not shown) may also be provided for use with the emergency alert apparatus 1. When provided, the GPS unit is capable of continuous positional read-out in a data format suitable for uplink by the transmitter 4. A separate antenna, or aerial, is provided for the GPS unit. The GPS unit may be capable of a maximum error of approximately 100 metres from the true position of the vehicle 2 at all vehicle speeds.

The control unit 9 is capable of power management for the GPS unit and transmitter 4 and also regulation and insulation of the power supply upon failure of the power supply of the vehicle 2. The control unit 9 also provides fail-safe operation by immediately transmitting an in-built unique identification number should tampering be experienced or the GPS unit fails during operation. In addition, the control unit 9 is preferably capable of selecting a standby mode to power down the GPS unit during prolonged stationary periods.

The emergency alert apparatus 1 may also incorporate a satellite telephone.

A casing (not shown) may be provided to house componentry of the emergency alert apparatus, such as the transmitter 4 and battery pack. The housing may be made from steel, duralium, ABS or other suitable material.

An embodiment of the method of alerting search and rescue personnel to an emergency condition of a land vehicle 2 and the manner of operation of the emergency alert apparatus 1 and emergency alert system 10 will now be described with particular reference to Figure 1.

When a land vehicle 2 is being driven in isolated areas, the emergency alert apparatus 1 is placed in its ON condition. In the ON condition, if the land vehicle

2 encounters an emergency condition, the emergency condition is sensed by the sensor 3. The emergency condition sensed by the sensor 3 includes impact or collision of the vehicle 2 or the vehicle 2 rolling over. In Figure 1, the vehicle 2 is shown to have impacted a tree 7 at the side of the road 8 upon which the vehicle 2 was travelling.

Once the sensor 3 senses an emergency condition, the control unit 9 receives a signal from the sensor 3 and the control unit 9 then activates the transmitter 4 which then emits an emergency alert signal 5. The emergency signal 5 is received by a receiver/transmitter 16. The receiver/transmitter 16 then emits a signal 18 which is received by a signal monitoring station 12. The signal monitoring station 12 is typically a search and rescue centre which is then able to arrange for dispatch of personnel, such as search and rescue services, to locate and assist the occupants of the vehicle 2. This may, for example, include dispatch of an ambulance 20 to the site of the vehicle 2.

Signal monitoring stations 12 may be, for example, police stations, medical centres in isolated areas, and emergency service operations.

As an alternative to the signal 5 being received by the receiver/transmitter 16, the signal 5 may be received directly by the signal monitoring station 12. However, since in most cases the distance between the vehicle 2 and a signal monitoring station 12 would prevent the signal 5 being received directly by the signal monitoring station 12, a receiver/transmitter 16 is used to issue a signal 18 which is then received by the signal monitoring station 12.

In each case, whether the signal monitoring station 12 receives the signal 5 from the transmitter 4 or the signal 18 from the receiver/transmitter 16, the signal monitoring station 12 receives a signal which is indicative of the emission of the emergency alert signal 5 by the transmitter 4. That signal may be the actual emergency alert sign 5 or the signal 18.

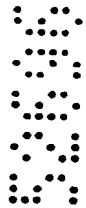
The transmitter 4 may be manually activated to emit the emergency alert signal 5 even if the sensor 3 does not sense an emergency condition. This is useful for the occupants of the land vehicle 2 in instances where the emergency condition is

not of the type sensed by the sensor 3. For example, one of the occupants of the land vehicle 2 may require medical assistance or the land vehicle 2 may encounter mechanical problems which would not in themselves cause the sensor 3 to sense an emergency condition.

In cases where the land vehicle 2 does encounter an emergency condition such as an impact or roll-over, since the occupants may not be able to manually activate the transmitter 4, sensing of the emergency condition by the sensor 3 ensures that the transmitter 4 emits an emergency alert signal 5 without need for manual activation.

Throughout this specification, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

Modifications and variations such as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS

1. An emergency alert apparatus for a land vehicle comprising sensor means arranged to be installed in the land vehicle and transmitter means operatively associated with said sensor means, wherein, in use, when said sensor means senses an emergency condition said transmitter means is activated and emits an emergency alert signal.
2. An emergency alert apparatus according to claim 1, wherein said emergency alert apparatus enables said emergency alert signal to be transmitted regardless of the orientation of said vehicle as a result of said emergency condition.
3. An emergency alert apparatus according to claim 1 or 2, wherein aerial means is provided for transmission of said emergency alert signal.
4. An emergency alert apparatus according to claim 3, wherein said aerial means comprises individual aerals provided on said vehicle such that at least one said aerial is able to transmit said emergency alert signal.
5. An emergency alert apparatus according to claim 3 or 4, wherein said aerial means comprises at least one part of said vehicle.
6. An emergency alert apparatus according to any one of the preceding claims, wherein manual override means is provided such that said transmitter means may be manually activated even if said sensor means does not sense an emergency condition.
7. An emergency alert apparatus according to any one of the preceding claims, wherein said emergency condition comprises one or more conditions selected from the groups of vehicle impact, vehicle collision and vehicle roll-over.
8. An emergency alert apparatus according to claim 7, wherein said vehicle impact or said vehicle collision comprises front, rear or side impact of the vehicle.

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9. An emergency alert apparatus according to claim 7 or 8, wherein said vehicle roll-over comprises rolling over of the vehicle on its roof or one of its sides.
10. An emergency alert apparatus according to any one of the preceding claims, wherein said sensor means comprises at least one sensor able to sense at least one emergency condition.
11. An emergency alert apparatus according to any one of the preceding claims wherein said sensor means comprises a separate sensor to sense one or more emergency conditions and at least two such sensors are provided.
12. An emergency alert apparatus according to any one of claims 1 to 11, further comprising a GPS unit.
13. An emergency alert apparatus according to any one of claims 1 to 12, wherein a power source is provided to supply power to said emergency alert apparatus.
14. An emergency alert apparatus according to any one of claims 1 to 13, wherein said transmitter means is operatively associated with said sensor means by control means such that, in use, upon said sensor means sensing an emergency condition said control means receives a signal from said sensor means and said control means then activates said transmitter means which emits said emergency alert signal.
15. An emergency alert system comprising an emergency alert apparatus according to any one of claims 1 to 14 and signal monitoring means to monitor signals that are indicative of the emission of said emergency alert signal by said transmitter means.
16. An emergency alert system according to claim 15, wherein said signal monitoring means is able to directly receive said emergency alert signal emitted by said transmitter means.
17. An emergency alert system according to claim 15 or 16, wherein said receiver/transmitter means is provided and is arranged to receive said

emergency alert signal and then transmit another signal that is received by said signal monitoring means.

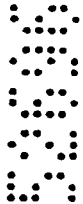
18. An emergency alert apparatus according to claim 17, wherein said receiver/transmitter means comprises two or more separate receiver/transmitter units that are able to relay a signal to said signal monitoring means.
19. A method of alerting search and rescue personnel to an emergency condition of a land vehicle comprising sensing an emergency condition encountered by a land vehicle, issuing an emergency alert signal and receiving a signal at a signal monitoring means which signal is indicative of said emergency condition.
20. A method according to claim 19, wherein said emergency alert signal is received directly by said signal monitoring means.
21. A method according to claim 19, wherein said emergency alert signal is received by receiver/transmitter means which then issues another signal which is received at said signal monitoring means.
22. A method according to any one of claims 19 to 21, wherein the signal that is received at the signal monitoring means is said emergency alert signal emitted by the transmitter means or a signal emitted by the receiver/transmitter means.
23. An emergency alert apparatus for a land vehicle substantially as hereinbefore described with reference to the accompanying drawing.
24. An emergency alert system substantially as hereinbefore described with reference to the accompanying drawing.

25. A method of alerting search and rescue personnel to an emergency condition of a land vehicle substantially as hereinbefore described with reference to the accompanying drawing.

Dated this FIFTH day of OCTOBER 1999.

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### ABSTRACT

An emergency alert apparatus (1) for a land vehicle (2) consists of one or more sensors (3) which are installed on the vehicle (2). A transmitter (4) is operatively associated with the sensors (3). In use, when the sensors (3) sense an emergency condition, the transmitter (4) is activated and emits an emergency alert signal (5).

An emergency alert system (10) is also provided and consists of the emergency alert apparatus (1) and a signal monitoring unit (12) to monitor signals (5; 18) that are indicative of the emission of the emergency alert signal (5) by the transmitter (4).

A method of alerting search and rescue personnel to an emergency condition of a land vehicle (2) is also described.

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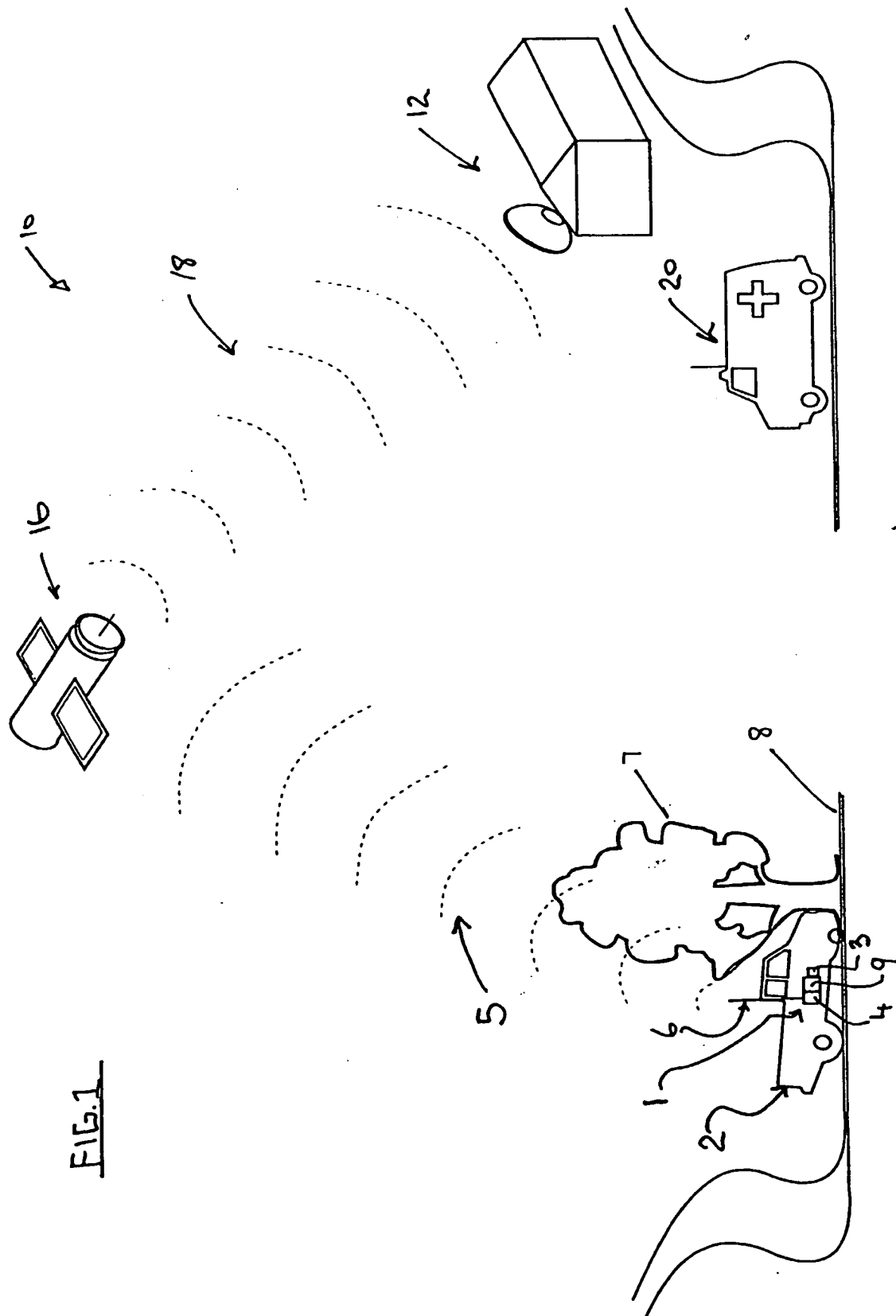


FIG. 1

5 10 00 5000

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